

This document gives pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a Minor, Municipal permit. The discharge results from the operation of a 0.375MGD wastewater treatment plant with a future expansion to 0.5 MGD. This permit action consists of updating the proposed effluent limits to reflect the current Virginia WQS (effective January 6, 2011) and updating permit language as appropriate. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9VAC25-260 et seq.

1. Facility Name and Mailing Address: Hopyard Farms WWTP
9207 Kings Hwy
King George, VA 22485
SIC Code : 4952 WWTP
Facility Location: State Route 607 (Port Conway Rd), approximately 1 mile south of the intersection of Route 3 and Route 607
County: King George
Facility Contact Name/Title : Jeff Hockaday
Wastewater Manager
Telephone Number: (540) 775-2746
Facility E-mail Address: jhockaday@co.kinggeorge.state.va.us
2. Permit No.: VA0089338
Expiration Date of previous permit: 4/22/2012
Other VPDES Permits associated with this facility: VAN020056
Other Permits associated with this facility: None
E2/E3/E4 Status: Not Applicable
3. Owner Name: King George County Service Authority
Owner Contact/Title: Christopher F. Thomas, PE
General Manager
Telephone Number: (540) 775-2746
Owner E-mail Address: cthomas@co.kinggeorge.state.va.us
4. Application Complete Date: 11/1/2011
Permit Drafted By: Alison Thompson
Date Drafted: July 25, 2012
Draft Permit Reviewed By: Joan Crowther
Date Reviewed: August 13, 2012
WPM Review By: Bryant Thomas
Date Reviewed: August 20, 2012
Public Comment Period : Start Date: End Date:
5. Receiving Waters Information: See Attachment 1 for the Flow Frequency Determination
Receiving Stream Name : Rappahannock River
Stream Code: 3-RPP
Drainage Area at Outfall: 1,755 sq.mi.
River Mile: 89.4
Stream Basin: Rappahannock
Subbasin: None
Section: 1
Stream Class: II
Special Standards: a
Waterbody ID: VAN-E21E
7Q10 Low Flow: Tidal
7Q10 High Flow: Tidal
1Q10 Low Flow: Tidal
1Q10 High Flow: Tidal
30Q10 Low Flow: Tidal
30Q10 High Flow: Tidal
Harmonic Mean Flow: Tidal
30Q5 Flow: Tidal

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

<input checked="" type="checkbox"/> State Water Control Law	<input type="checkbox"/> EPA Guidelines
<input checked="" type="checkbox"/> Clean Water Act	<input checked="" type="checkbox"/> Water Quality Standards
<input checked="" type="checkbox"/> VPDES Permit Regulation	<input type="checkbox"/> Other
<input checked="" type="checkbox"/> EPA NPDES Regulation	

7. Licensed Operator Requirements: Class II

8. Reliability Class: Class I

9. Permit Characterization:

<input type="checkbox"/> Private	<input type="checkbox"/> Effluent Limited	<input type="checkbox"/> Possible Interstate Effect
<input type="checkbox"/> Federal	<input checked="" type="checkbox"/> Water Quality Limited	<input type="checkbox"/> Compliance Schedule Required
<input type="checkbox"/> State	<input type="checkbox"/> Toxics Monitoring Program Required	<input type="checkbox"/> Interim Limits in Permit
<input checked="" type="checkbox"/> POTW	<input type="checkbox"/> Pretreatment Program Required	<input type="checkbox"/> Interim Limits in Other Document
<input checked="" type="checkbox"/> TMDL		

10. Wastewater Sources and Treatment Description:

This facility received its Certificate to Operate (CTO) on July 11, 2006. At the time of the last reissuance, flows to the treatments works were so low that the wastewater was pumped and hauled to the Fairview Beach WWTP (VA0092134) for treatment. The facility commenced discharge in May 2007.

Influent flows to the Hopyard Farms WWTP flow through the headworks which consists of a bar screen and screw auger that removes rags; there is a bypass channel with a manual bar screen. The screened flow then enters a pre-equalization tank. As flows leave the equalization tank, Aluminum Sulfate and Soda Ash are added before the flows enter one of the two Sequencing Batch Reactors (SBRs) for biological treatment. Flows from the SBRs enter another equalization tank before they are pumped to ultraviolet disinfection, post aerated and discharged to the Rappahannock River. The outfall pipe runs for approximately 0.5 mile then extends about 100 feet into the river. The pipe is submerged. The outfall line is directly adjacent to the Hopyard Landing pier.

Flows at the facility are averaging 0.022 MGD each month. Because of the low flows, the facility is batch discharging typically once per week.

See Attachment 2 for a facility schematic/diagram.

TABLE 1 – Outfall Description

Outfall Number	Discharge Sources	Treatment	Design Flow(s)	Outfall Latitude and Longitude
001	Domestic Wastewater and backwash water from the Hopyard Farms Water Treatment Plant	See Item 10 above.	0.375 MGD and 0.5 MGD	38° 14' 39" N 77° 13' 32" W
See Attachment 3 for (Port Royal Quad, DEQ #168B) topographic map.				

11. Sludge Treatment and Disposal Methods:

The Waste Activated Sludge generated in the SBRs is pumped into an aerated digester and stored until it is hauled to the King George County Service Authority's Dahlgren WWTP (VA0026514) for further treatment.

12. Discharges, Intakes, Monitoring Stations, Other Items in Vicinity of Discharge

TABLE 2 RAPPAHANNOCK RIVER DISCHARGES, INTAKES, AND MONITORING STATIONS	
Approximate Rappahannock River Mile	Description
113.57	USGS Gaging Station (Fredericksburg)
110.57	DEQ Sampling Station 3-RPP110.57
107.99	Discharge – City of Fredericksburg WWTF, VPDES VA0025127, Major-Municipal
107.91	DEQ Sampling Station 3-RPP107.91
107.43	Discharge – FMC WWTP, VPDES VA0068110, Major-Municipal
107.49	Tributary with Discharge – Deep Run, Quarles Petroleum – Fredericksburg Bulk Oil Terminal, VPDES VA0029785, Minor-Industrial
107.33	DEQ Sampling Station 3-RPP107.33
106.01	DEQ Sampling Station 3-RPP106.01
104.53	Discharge – Massaponax STP, VPDES VA0025658, Major-Municipal
104.61	Discharge – Little Falls Run STP, VPDES VA0076392, Major-Municipal
104.47	DEQ Sampling Station 3-RPP104.47
103.77	Tributary with Discharge – Ruffins Creek, Culpeper Wood Preservers, VPDES VA0090468, Minor-Industrial
103.77	Tributary with Discharge – Ruffins Pond, Vulcan Construction Materials, VPDES VAG110098, Ready-Mix Concrete GP
99.05	Discharge – Aggregate Industries MAR – Hayfield Sand and Gravel, VPDES VAG840195, Non-Metallic Mineral Mining GP
98.81	DEQ Sampling Station 3-RPP098.81
96.5	Industrial Water Supply – VA0087645, SEI Birchwood, Minor-Industrial, 6.6 MGD maximum intake
96.57	Discharge - SEI Birchwood, VA0087645, Minor-Industrial, 1.14 MGD maximum
95.56	DEQ Sampling Station 3-RPP095.56
95.58	Tributary with Discharge – Birchwood Creek- UT , Greenhost Inc., VA0090654, Minor-Industrial, 1.9 MGD maximum (stormwater)
93.52	Discharge – Four Winds Campground, VPDES VA0060429, Minor-Municipal
91.60	Tributary with Discharge – Birchwood Creek, UT, Royster Clark Inc – Sealston, VPDES VA0088374, Minor-Industrial
91.55	DEQ Sampling Station 3-RPP091.55
89.4	Discharge – Hopyard Farm Wastewater Treatment Plant, VPDES VA0089338, Minor-Municipal
88.22	DEQ Sampling Station 3-RPP088.22
86.65	Tributary with Discharge – Rappahannock River-UT, Haymount WWTF, VPDES VA0089125, Minor-Municipal (not built)
80.19	U.S. Route 301 Bridge at Port Royal
80.19	DEQ Sampling Station 3-RPP080.19

13. Material Storage:

TABLE 3 - Material Storage		
Materials Description	Volume Stored	Spill/Stormwater Prevention Measures
Aluminum Sulfate	Approx 1000 lbs (20 x 50 lb bags)	Stored in the control building
Soda Ash (Sodium Bicarbonate)	Approx 1000 lbs (20 x 50 lb bags)	Stored in the control building

14. Site Inspection:

Performed by DEQ Compliance Staff on June 7, 2011 (Attachment 4).

15. Receiving Stream Water Quality, Water Quality Standards, and TMDL Information:a) Ambient Water Quality Data

This facility discharges into the tidal Rappahannock River. The nearest DEQ monitoring station is 3-RPP091.55, located approximately 0.43 miles upstream from Outfall 001. The following is the water quality summary for this segment of the Rappahannock River, as taken from the Draft 2012 Integrated Report* (*The Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently being finalized and prepared for release.):

DEQ Chesapeake Bay and ambient stations: 3-RPP088.22, located near the confluence with Jones Top Creek; 3-RPP091.55 at Buoy 89; and 3-RPP095.56, located approximately 500 yards upstream from the Four Winds Campground boat ramp were used for the assessment. Fish consumption use was assessed using DEQ fish tissue/sediment station 3-RPP080.19, located in a downstream segment.

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory and sufficient excursions above the fish tissue value (TV) for PCBs in fish tissue. Additionally, excursions above the risk-based tissue value (TV) of 300 parts per billion (ppb) for mercury (Hg) in fish tissue was recorded in one species of fish (1 total samples) collected in 2006 at monitoring station 3-RPP080.19 (channel catfish), noted by an observed effect.

The wildlife, recreation and aquatic life uses are considered fully supporting. The shellfishing use was not assessed.

b) 303(d) Listed Stream Segments and Total Maximum Daily Loads (TMDLs)

It should be noted that the recreation use in this segment of the Rappahannock River was identified for delisting in the Draft 2012 IR based upon an acceptable exceedance rate of *E. coli* bacteria. The stretch of the tidal Rappahannock River from Ware Creek downstream to Mill Creek is no longer impaired for bacteria. The tidal Rappahannock from the fall line at Route 1 to Ware Creek remains listed as impaired for bacteria. A bacteria TMDL for the Tidal Rappahannock River was completed and approved by EPA. The facility received a WLA in the TMDL, please see the information below.

TABLE 4 – 303(d) Impairment and TMDL information for the receiving stream segment						
Waterbody Name	Impaired Use	Cause	TMDL completed	WLA	Basis for WLA	TMDL Schedule
<i>Impairment Information in the Draft 2012 Integrated Report*</i>						
Rappahannock River	Fish Consumption	PCBs	No	NA	---	2016
	<i>Delisted (Recreation)</i>	<i>Delisted (E. coli)</i>	Tidal Freshwater Rappahannock River Bacteria	8.70E+11 cfu/year <i>E. coli</i>	126 cfu/100ml --- 0.5 MGD	---

Also, Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal, and the 2010 Integrated Report indicates that much of the mainstem Bay does not fully support this use support goal under Virginia's Water Quality Assessment guidelines. Nutrient enrichment is cited as one of the primary causes of impairment. EPA issued the Chesapeake Bay TMDL on December 29, 2010. It was based, in part, on the Watershed Implementation Plans developed by the Bay watershed states and the District of Columbia.

The Chesapeake Bay TMDL addresses all segments of the Bay and its tidal tributaries that are on the impaired waters list. As with all TMDLs, a maximum aggregate watershed pollutant loading necessary to achieve the Chesapeake Bay's water quality standards has been identified. This aggregate watershed loading is divided among the Bay states and their major tributary basins, as well as by major source categories [wastewater, urban storm water, onsite/septic agriculture, air deposition]. Fact Sheet Section 17.e provides additional information on specific nutrient limitations for this facility to implement the provisions of the Chesapeake Bay TMDL.

The full planning statement is found in Attachment 5.

c) Receiving Stream Water Quality Criteria

Part IX of 9VAC25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream, Rappahannock River, is located within Section 1 of the Rappahannock River Basin, and classified as a Class II water.

Section 1 of the Rappahannock River is defined as "The Rappahannock River and the tidal portions of its tributaries from Stingray and Windmill Points to the Route 1 Alternate (Mayfield) Bridge at Fredericksburg." The Class II Tidal Freshwater boundary is defined as "Tidal Freshwater from the fall line of the Rappahannock River to Buoy 37 near Tappahannock, VA, including all tidal tributaries that enter the tidal freshwater Rappahannock River. Freshwater criteria instead of saltwater criteria apply to this tidal freshwater zone.

Class II tidal waters in the Chesapeake Bay and its tidal tributaries must meet dissolved oxygen concentrations as specified in 9VAC25-260-185 and maintain a pH of 6.0-9.0 standard units as specified in 9VAC25-260-50. In the Northern Virginia area, Class II waters must meet the Migratory Fish Spawning and Nursery Designated Use from February 1 through May 31. For the remainder of the year, these tidal waters must meet the Open Water use. The applicable dissolved oxygen concentrations are presented Attachment 6.

Attachment 7 details other water quality criteria applicable to the receiving stream.

Ammonia:

The fresh water, aquatic life Water Quality Criteria for Ammonia are dependent on the instream temperature and pH. The 90th percentile temperature and pH values are used because they best represent the critical design conditions of the receiving stream. A pH value of 7.5 s.u. and a year-round temperature value of 26°C were used to establish the ammonia criteria during the last reissuance. The derivation of these values could not be located in DEQ's files. Staff reviewed the pH values reported on the facility's Discharge Monitoring Reports (DMRs); it is staff's best professional judgment that these values are still appropriate and will be carried forward with this reissuance. A default value of 15°C will be used for the wet weather criteria.

For this permit reissuance, the receiving stream ambient monitoring data for pH and temperature came from data collected from DEQ Ambient Monitoring Station 3-RPP104.47 during the period of April 2007 to December 2009. The 90th percentile pH and temperature values calculated for the river are 7.6 S.U. and 28.2°C; a default value of 15°C will be used for the wet weather criteria. See Attachment 7 for the 90th percentile pH and temperature values derived from DEQ Ambient Monitoring Station 3-RPP104.47 data.

The seasonal tiers for the Rappahannock River are November through April and May through October. These tiers, established by the VIMS Model, reflect the division between winter and summer periods relative to temperature in the Rappahannock River.

Metals Criteria:

The Water Quality Criteria for some metals are dependent on the receiving stream's hardness (expressed as mg/L calcium carbonate). During the last reissuance, a total hardness value of 28 mg/L was used to establish metals criteria. As part of the current permit, the facility performed a total hardness analysis which was submitted as part of the application. The effluent total hardness is 37 mg/L. This value was used for the effluent in the calculations for the hardness-dependent metals criteria presented in Attachment 7.

The average hardness of the receiving stream determined through analysis of the data from monitoring stations 3-RPP107.91 and 3-RPP104.47 for the period of April 1992 to May 2001 is 29 mg/L. The average hardness of the effluent from all the major wastewater treatment plants in the upper tidal portion of the Rappahannock River ranges from 57 to 125 mg/L. It is intuitive that under design conditions the instream hardness will begin to approach that of the hardness from the wastewater treatment plants. Due to the presence of multiple dischargers in the upper tidal portion of the Rappahannock River and the uncertainty of the mixing zones, staff does not feel it is feasible to perform an accurate mass balance between the hardness of the effluent from the wastewater treatment plants and the receiving stream. Therefore, a total hardness value of 50 mg/L, as recommended by DEQ guidance, should adequately estimate the river hardness under design conditions. This total hardness value was used for the stream total hardness to determine the water quality criteria for metals in Attachment 7.

Bacteria Criteria:

The Virginia Water Quality Standards at 9VAC25-260-170A state that the following criteria shall apply to protect primary recreational uses in surface waters:

- 1) *E. coli* bacteria per 100 ml of water shall not exceed a monthly geometric mean of the following:

	Geometric Mean ¹
Freshwater <i>E. coli</i> (N/100 ml)	126

¹For a minimum of four weekly samples [taken during any calendar month].

d) Receiving Stream Special Standards

The State Water Control Board's Water Quality Standards, River Basin Section Tables (9VAC25-260-360, 370 and 380) designates the river basins, sections, classes, and special standards for surface waters of the Commonwealth of Virginia. The receiving stream, Rappahannock River, is located within Section 1 of the Rappahannock Basin. This section has been designated with a special standard of a.

The receiving stream has been designated with a special standard of "a." According to 9VAC25-260-310.a, Special Standard a applies to all open ocean or estuarine waters capable of propagating shellfish or in specific areas where public or leased private shellfish beds are present, including those waters on which condemnation or restriction classifications are established by the State Department of Health. The fecal coliform bacteria standard is as follows: the geometric mean fecal coliform value for a sampling station shall not exceed an MPN (Most probable number) of 14 per 100 milliliters of sample and the 90th percentile shall not exceed 43 for a 5-tube, 3-dilution or 49 for a 3-tube, 3-dilution test. The shellfish area is not to be so contaminated by radionuclides, pesticides, herbicides, or fecal material that the consumption of shellfish might be hazardous. This same standard is also contained in 9VAC25-260-160. Fecal Coliform Bacteria; Shellfish Waters. This standard is used for the interpretation of instream monitoring data and not for setting fecal coliform effluent limitations.

On January 15, 2003, new bacteria standards in the Water Quality Standards (9VAC25-260-170.A.) became effective as did a revised disinfection policy, 9VAC25-260-170.B. These standards replaced the fecal coliform standard; thus, *E. coli* and enterococci bacteria became the criteria. It has been demonstrated that the limit for *E. coli* of 126 N/100 mL, which is applicable for Freshwater, is protective of Special Standard "a" and will be carried forward with this reissuance.

e) Threatened or Endangered Species

The Virginia DGIF Fish and Wildlife Information System Database was searched on July 25, 2012, for records to determine if there are threatened or endangered species in the vicinity of the discharge. No threatened or endangered species were identified.

The stream that the facility discharges to is within a reach identified as having an Anadromous Fish Use. It is staff's best professional judgment that the proposed limits are protective of this use. The DGIF search results have been placed in the reissuance file.

f) Virginia Institute of Marine Science (VIMS) Rappahannock River Model

Stafford County, Spotsylvania County, and the City of Fredericksburg sponsored a water quality model for the upper Rappahannock River estuary developed by the Virginia Institute for Marine Science (VIMS) entitled a Modeling Study of the Water Quality of the Upper Rappahannock River or the VIMS model. This model was approved by the State Water Control Board Director on December 6, 1991 and has been used to determine effluent limitations for existing, new, and expanding VPDES discharges in the upper Rappahannock River since then.

This model had been run on the following occasions: August 1995, for the issuance of the Haymount permit and the flow expansion at the Fredericksburg STP; August 1996, for the issuance of the Hopyard Farms WWTP permit; March 1997, for changes in flow and production at White Packing; April 1999, to accommodate flow expansions at the Little Falls Run WWTF and the Massaponax WWTF; April 2003 for the expansion of the proposed Hopyard Farms WWTP to 0.5 MGD; January 2005, to accommodate an additional flow tier of 13.0 MGD in the Little Falls Run VPDES permit; August 2006 to model the loadings for the Fredericksburg STP at 4.5 MGD, and March 2010 to accommodate the transfer of 1.4 MGD of flow from the FMC WWTF to the Massaponax WWTF. A summary of the numerous scenarios analyzed and predicted outcomes using the VIMS model is found in Attachment 8.

16. Antidegradation (9VAC25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

This receiving stream has been classified as Tier 1 since the VIMS Model (Attachment 8) shows that the dissolved oxygen standards for surface water in this area of the Rappahannock River are minimally met and that chlorophyll a levels are elevated in the summer months which necessitates the need for Total Phosphorus limits to protect local water quality. Permit limits proposed have been established by determining wasteload allocations that will result in attaining and/or maintaining all water quality criteria applicable to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development:

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points is equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLAs) are calculated. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent concentration values is greater than the chronic wasteload allocation. Effluent limitations are the calculated on the most limiting WLA, the required sampling frequency, and statistical characteristics of the effluent data.

a) Effluent Screening:

Effluent data obtained from the permit application (the priority pollutant scan) and the Discharge Monitoring Reports (DMRs) has been reviewed and determined to be suitable for evaluation.

The following pollutants require a wasteload allocation analysis: Ammonia as N and Dissolved Zinc.

b) Determining Wasteload Allocations (WLAs):

Acute Toxicity - DEQ-Guidance Memorandum 00-2011 states that for surface discharges into tidal estuaries or estuarine embayments, the acute wasteload allocation WLA_a should be set at two times the acute standard because initial mixing in these circumstances is limited and lethality in the allocated impact zone must be prevented. The 2X factor is derived from the fact that the acute standard or criteria maximum concentration (CMC) is defined as one half of the final acute value (FAV) for a specific toxic pollutant. The FAV prevents acute toxicity 95% of time for the genera tested. If the acute value is one half the FAV, then two times the acute standard should equal the FAV or equal an acceptable value for preventing lethality. The Acute WLAs in Attachment 7 were calculated using this 2:1 factor.

Chronic Toxicity - DEQ Guidance Memo 00-2011 states that for surface discharges into tidal estuaries, estuarine embayments, or the open ocean, the chronic wasteload allocation (WLA_c) should be based on site specific data for waste dispersion or dilution when available and appropriate. Where wastewater dispersion/dilution data are not available, a dilution ratio of 50:1 may be used. Because the discharge is small in relation to the receiving stream flows, staff concurs with the recommendation of the guidance memo. The Chronic WLAs in Attachment 7 were calculated using this 50:1 factor.

Staff derived wasteload allocations where parameters are reasonably expected to be present in an effluent and where effluent data indicate the pollutant is present in the discharge above quantifiable levels. With regard to the Hopyard Farms WWTP discharge, monitoring data indicate that wasteload allocations be calculated for Ammonia as N. Ammonia as N requires determination of a wasteload allocation because the discharge is from a sewage treatment plant. See Attachment 7 for WLA derivations.

c) Effluent Limitations Toxic Pollutants, Outfall 001 –

9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9VAC25-31-230.D requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N:

The Virginia Institute for Marine Science (VIMS) Model was used to determine the ammonia limitations for the Hopyard Farm WWTP. When the permit was issued in 1996, DEQ guidance at that time suggested using a single data point of 10 mg/L for discharges containing domestic sewage and a 4 day chronic averaging period to ensure the evaluation adequately addressed the potential for ammonia to be present in the discharge to determine if limits were necessary. More recent WQS has altered the chronic averaging period to 30 days and substituted an average weekly maximum instead of the maximum daily limit. The Ammonia as N limitations were last updated for this facility in April 2003 when the 0.5 MGD expansion was placed in the permit. The Hopyard Farms WWTP was assigned a summer Ammonia as N monthly average concentration of 10.7 mg/L and was rounded to 11 mg/L. The winter Ammonia as N monthly average concentration of 12.4 mg/L was established and was rounded to 12 mg/L. A summary of the most recent VIMS Model Run dated March 2010 and the table of the resulting effluent limits are found in Attachment 8.

2) Metals and Organics:

The facility performed a priority pollutant scan during the current permit term. The only parameter detected in a quantifiable amount was Dissolved Zinc at 42 ug/L. The WLAc is 330 ug/L and the WLAa is 120 ug/L. No limit is necessary for Dissolved Zinc; the statistical analysis can be found in Attachment 7.

d) Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants

No changes to dissolved oxygen (D.O.), biochemical oxygen demand-5 day (BOD₅), total suspended solids (TSS), and pH limitations are proposed.

Dissolved Oxygen and BOD₅ limitations are based on the VIMS modeling (Attachment 8) and are set to meet the water quality criteria for D.O. in the receiving stream.

It is staff's practice to equate the Total Suspended Solids limits with the BOD₅ limits. TSS limits are established to equal BOD₅ limits since the two pollutants are closely related in terms of treatment of domestic sewage.

pH limitations are set at the water quality criteria.

E. coli limitations are in accordance with the Water Quality Standards 9VAC25-260-170.

e) Effluent Annual Average Limitations and Monitoring, Outfall 001 – Nutrients

VPDES Regulation 9VAC25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay.

As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries. Only concentration limits are now found in the individual VPDES permit when the facility installs nutrient removal technology. The basis for the concentration limits is 9VAC25-40 - *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed* which requires new or expanding discharges with design flows of ≥ 0.04 MGD to treat for TN and TP to either BNR levels (TN = 8.0 mg/L; TP = 1.0 mg/L) or SOA levels (TN = 3.0 mg/L and TP = 0.30 mg/L).

This facility has also obtained coverage under 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia*. This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit as well as compliance schedules and other permit requirements, shall be authorized, monitored, limited, and otherwise regulated under the general permit and not this individual permit. This facility has coverage under this General Permit; the permit number is VAN020056. Total Nitrogen Annual Loads and Total Phosphorus Annual Loads from this facility are found in 9VAC25-720 – *Water Quality Management Plan Regulation* which sets forth TN and TP maximum wasteload allocations for facilities designated as significant discharges, i.e., those with design flows of ≥ 0.5 MGD above the fall line and ≥ 0.1 MGD below the fall line.

Monitoring for Nitrates + Nitrites, Total Kjeldahl Nitrogen, Total Nitrogen, and Total Phosphorus are included in this permit. The monitoring is needed to ensure the protection of the Water Quality Standards of the Chesapeake Bay. Monitoring frequencies are set at the frequencies set forth in 9VAC25-820. Annual average effluent limitations, as well as monthly and year to date calculations, for Total Nitrogen and Total Phosphorus are included in this individual permit. The annual averages are based on 9VAC25-40 and GM07-2008.

The monthly average Total Phosphorus limitations at the 0.375 MGD tier are based on staff's best professional judgment. It is staff's experience that WWTP discharges without Phosphorus (P) controls will cause algal blooms in ponds, small impoundments, and still waters in general. Since there is no model or

chlorophyll criteria by which to derive a P limit, staff use their experience with facilities that must comply with the 2.0 mg/L requirements of the Nutrient Policy and require the same limit. This limit has been shown to provide sufficient control on P to avoid nuisance algal blooms. The regulatory basis for this approach is 9VAC25-31-220 D.

f) Effluent Limitations and Monitoring Summary.

The effluent limitations are presented in the following tables.

At the 0.375 MGD tier, limits were established for Flow, BOD₅, Total Suspended Solids, Ammonia as N, pH, Dissolved Oxygen, Total Nitrogen (Annual Average), Total Phosphorus (Monthly Average), and *E. coli*.

At the 0.5 MGD tier, limits were established for Flow, BOD₅, Total Suspended Solids, Ammonia as N, pH, Dissolved Oxygen, Total Nitrogen (Annual Average), Total Phosphorus (Annual Average), and *E. coli*.

The limit for Total Suspended Solids is based on Best Professional Judgement.

The mass loading (kg/d) for monthly and weekly averages were calculated by multiplying the concentration values (mg/L), with the flow values (in MGD) and a conversion factor of 3.785.

The mass loading (lb/d) for monthly and weekly averages were calculated by multiplying the concentration values (mg/L), with the flow values (in MGD) and a conversion factor of 8.345.

Sample Type and Frequency are in accordance with the recommendations in the VPDES Permit Manual.

While the BOD₅ limitations in this permit are the same as those prescribed in the VPDES Permit Regulation at 9VAC25-31-30 and 40 CFR Part 133, the limits presented in the effluent tables are water-quality based and were established using the VIMS model (Attachment 8). The VPDES Permit Regulation at 9VAC25-31-30 and 40 CFR Part 133 require that the facility achieve at least 85% removal for BOD and TSS (or 65% for equivalent to secondary).

18. Antibacksliding:

All limits in this permit are at least as stringent as those previously established. Backsliding does not apply to this reissuance.

19.a. Effluent Limitations/Monitoring Requirements:

Design flow is 0.375 MGD.

Effective Dates: During the period beginning with the permit's effective date and lasting until the expiration date or the issuance of the CTO for the 0.5 MGD flow tier, whichever comes first.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	3	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
BOD ₅	3,5	30 mg/L 43 kg/day	45 mg/L 64 kg/day	NA	NA	5D/W	8H-C
Total Suspended Solids (TSS)	2	30 mg/L 43 kg/day	45 mg/L 64 kg/day	NA	NA	5D/W	8H-C
Dissolved Oxygen (DO)	3, 5	NA	NA	6.0 mg/L	NA	1/D	Grab
Ammonia, as N (mg/L) May-Oct	3, 5	11 mg/L	14 mg/L	NA	NA	5D/W	8H-C
Ammonia, as N (mg/L) Nov-Apr	3, 5	12 mg/L	16 mg/L	NA	NA	5D/W	8H-C
<i>E. coli</i> (Geometric Mean)	3	126 n/100mls	NA	NA	NA	5D/W	Grab
Total Kjeldahl Nitrogen (TKN)	3, 6	NL mg/L	NA	NA	NA	1/2W	8H-C
Nitrate+Nitrite, as N	3, 6	NL mg/L	NA	NA	NA	1/2W	8H-C
Total Nitrogen ^a .	3, 6	NL mg/L	NA	NA	NA	1/2W	Calculated
Total Nitrogen – Year to Date ^b .	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen - Calendar Year ^b .	3, 6	8.0 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	3, 5	2.0 mg/L 63 lb/day	NA	NA	NA	1/2W	8H-C

The basis for the limitations codes are:

1. Federal Effluent Requirements

2. Best Professional Judgment

3. Water Quality Standards

4. DEQ Disinfection Guidance

5. Stream Model- Attachment 8

6. 9VAC25-40 (Nutrient Regulation)

MGD = Million gallons per day.*NA* = Not applicable.*NL* = No limit; monitor and report.*S.U.* = Standard units.*TIRE* = Totalizing, indicating and recording equipment.*1/D* = Once every day.*5D/W* = Five days a week.*1/2W* = Once every two weeks, >7 days apart*1/M* = Once every month*1/YR* = Once every calendar year

8H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the Monitored 8-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of eight (8) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum eight (8) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by =10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

a. Total Nitrogen = Sum of TKN plus Nitrate+Nitrite

b. See Section 20.a. for more information on the Nutrient Calculations.

19.b. Effluent Limitations/Monitoring Requirements:

Design flow is 0.5 MGD.

Effective Dates: During the period beginning with the CTO for the 0.5 MGD tier and lasting until the expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		<u>Monthly Average</u>	<u>Weekly Average</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Frequency</u>	<u>Sample Type</u>
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	3	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
BOD ₅	3, 5	30 mg/L 57 kg/day	45 mg/L 85 kg/day	NA	NA	5D/W	8H-C
Total Suspended Solids (TSS)	2	30 mg/L 57 kg/day	45 mg/L 85 kg/day	NA	NA	5D/W	8H-C
Dissolved Oxygen (DO)	3, 5	NA	NA	6.0 mg/L	NA	1/D	Grab
Ammonia, as N (mg/L) May-Oct	3, 5	11 mg/L	14 mg/L	NA	NA	5D/W	8H-C
Ammonia, as N (mg/L) Nov-Apr	3, 5	12 mg/L	16 mg/L	NA	NA	5D/W	8H-C
<i>E. coli</i> (Geometric Mean)	3	126 n/100mls	NA	NA	NA	5D/W	Grab
Nitrate+Nitrite, as N	3, 6	NL mg/L	NA	NA	NA	1/2W	8H-C
Total Kjeldahl Nitrogen (TKN)	3, 5	NL mg/L	NA	NA	NA	1/2W	8H-C
Total Nitrogen ^a .	3, 6	NL mg/L	NA	NA	NA	1/2W	Calculated
Total Nitrogen – Year to Date ^b .	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen - Calendar Year ^b .	3, 6	4.0 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	3, 6	NL mg/L	NA	NA	NA	1/2W	8H-C
Total Phosphorus – Year to Date ^b .	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Phosphorus - Calendar Year ^b .	3, 6	0.30 mg/L	NA	NA	NA	1/YR	Calculated

The basis for the limitations codes are:

1. Federal Effluent Requirements

2. Best Professional Judgment

3. Water Quality Standards

4. DEQ Disinfection Guidance

5. Stream Model- Attachment 8

6. 9VAC25-40 (Nutrient Regulation)

MGD = Million gallons per day.*NA* = Not applicable.*NL* = No limit; monitor and report.*S.U.* = Standard units.*TIRE* = Totalizing, indicating and recording equipment.*1/D* = Once every day.*5D/W* = Five days a week.*1/2W* = Once every two weeks, >7 days apart*1/M* = Once every month.*1/YR* = Once every calendar year

8H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the Monitored 8-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of eight (8) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum eight (8) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by =10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

a. Total Nitrogen = Sum of TKN plus Nitrate+Nitrite

b. See Section 20.a. for more information on the Nutrient Calculations.

20. Other Permit Requirements:

- a) Part I.B. of the permit contains quantification levels and compliance reporting instructions. 9VAC25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9VAC25-31-220.D requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

The calculations for the Nitrogen and Phosphorus parameters shall be in accordance with the calculations set forth in 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia*. §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9VAC25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, these reporting calculations are intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

21. Other Special Conditions:

- a) 95% Capacity Reopener. The VPDES Permit Regulation at 9VAC25-31-200.B.4 requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. This facility is a POTW.
- b) Indirect Dischargers. Required by VPDES Permit Regulation, 9VAC25-31-200 B.1 and B.2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.
- c) O&M Manual Requirement. Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190.E. The permittee shall maintain a current Operations and Maintenance (O&M) Manual. The permittee shall operate the treatment works in accordance with the O&M Manual and shall make the O&M Manual available to Department personnel for review upon request. Any changes in the practices and procedures followed by the permittee shall be documented in the O&M Manual within 90 days of the effective date of the changes. Non-compliance with the O&M Manual shall be deemed a violation of the permit.
- d) CTC, CTO Requirement. The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.
- e) Licensed Operator Requirement. The Code of Virginia at §54.1-2300 et seq. and the VPDES Permit Regulation at 9VAC25-31-200 C, and Rules and Regulations for Waterworks and Wastewater Works Operators (18VAC160-20-10 et seq.) requires licensure of operators. This facility requires a Class II operator.
- f) Reliability Class. The Sewage Collection and Treatment Regulations at 9VAC25-790 require sewage treatment works to achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. Reliability means a measure of the ability of the treatment works to perform its designated function without failure or interruption of service. The facility is required to meet a reliability Class of I.
- g) Water Quality Criteria Reopener. The VPDES Permit Regulation at 9VAC25-31-220 D. requires establishment of effluent limitations to ensure attainment/maintenance of receiving stream water quality criteria. Should data collected and submitted for Attachment A of the permit, indicate the need for limits to ensure protection of water quality criteria, the permit may be modified or alternately revoked and reissued to impose such water quality-based limitations.

- h) Water Quality Criteria Monitoring. State Water Control Law §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility's effluent for the substances noted in Attachment A of this VPDES permit within 6 months of receiving the CTO for the 0.5 MGD flow tier.
- i) Sludge Reopener. The VPDES Permit Regulation at 9VAC25-31-220.C requires all permits issued to treatment works treating domestic sewage (including sludge-only facilities) include a reopener clause allowing incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the CWA. The facility includes a sewage treatment works.
- j) Sludge Use and Disposal. The VPDES Permit Regulation at 9VAC25-31-100.P; 220.B.2, and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. The facility includes a treatment works treating domestic sewage.
- k) E3/E4. 9VAC25-40-70B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.
- l) Nutrient Reopener. 9VAC25-40-70A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9VAC25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.
- m) TMDL Reopener: This special condition is to allow the permit to reopened if necessary to bring it in compliance with any applicable TMDL that may be developed and approved for the receiving stream.

Permit Section Part II. Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

22. Changes to the Permit from the Previously Issued Permit:

- a) Special Conditions:
 - 1) The O&M Manual special condition was updated in accordance with current agency guidance.
- b) Monitoring and Effluent Limitations:

No changes are proposed to the effluent limitations.

23. Variances/Alternate Limits or Conditions:

None

24. Public Notice Information:

First Public Notice Date:

Second Public Notice Date:

Public Notice Information is required by 9VAC25-31-280 B. All pertinent information is on file and may be inspected, and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193, Telephone No. (703) 583-3834, Alison.Thompson@deq.virginia.gov. See Attachment 9 for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may request an electronic copy of the draft permit and fact sheet or review the draft permit and application at the DEQ Northern Regional Office by appointment.

25. Additional Comments:

Previous Board Action(s): None

Staff Comments:

The reissuance was delayed due to staff workload.

The facility has had effluent limited exceedances intermittently since the facility commenced discharge and has received Warning Letters. The most recent Warning Letter was issued in February 2012 for the 2011 Annual Average Total Nitrogen Concentration. The permit requires an annual average of 8.0 mg/L and the facility reported a concentration of 10.3 mg/L. There have been no effluent violations in 2012. The design flow of the WWTP is 0.375 MGD, but flows are averaging 0.022 MGD. The low flows to the oversized facility make it difficult to maintain the optimal biological treatment in the SBRs. Plant personnel currently batch discharge typically once per week to try to provide the maximum treatment possible prior to discharge.

Public Comment:

EPA Checklist: The checklist can be found in Attachment 10.